UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
08/847,967	04/22/1997	Isy Goldwasser	016703-00080	2173

7590 10/12/2006

MADELINE JOHNSTON, ESQ.
KING & SPALDING LLP
191 PEACHTREE STREET
ATLANTA, GA 30303-1763

EXAMINER	
EPPERSON, JON D	
ART UNIT	**PAPER NUMBER**
1639	

DATE MAILED: 10/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No. 08/847,967	Applicant(s) GOLDWASSER ET AL.	
	Examiner Jon D. Epperson	Art Unit 1639	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 July 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *See Continuation Sheet* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *8,10,11,15-24,26,30-35,42,43,45-49,51-56,58-60,64-72,74-91,93,95,96,98 and 99* is/are rejected.

7)☒ Claim(s) *94 and 97* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of the Application

1. The Response filed July 12, 2006 is acknowledged.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior office action.

Status of the Claims

3. Claims 8, 10, 11, 15-24, 26, 30-35, 42, 43, 45-49, 51-56, 58-60, 64-72, 74-91 and 93-99 were pending. Applicants amended claim 77. No claims were added or canceled. Therefore, claims 8, 10, 11, 15-24, 26, 30-35, 42, 43, 45-49, 51-56, 58-60, 64-72, 74-91 and 93-99 are currently pending and examined on the merits.

Withdrawn Objections/Rejections

4. The objection to claim 77 is withdrawn in view of Applicants' amendment thereto. All other rejections are maintained and the arguments are addressed below.

Outstanding Objections and/or Rejections

Claims Rejections - 35 U.S.C. 102

5. Claims 8, 10, 11, 15-19, 23, 24, 26, 30-33, 42, 43, 45-49, 51-55, 59, 60, 64-72, 74-78, 80, 82, 83, 88-91, 93, 96 and 99 are rejected under 35 U.S.C. 102(b) as being anticipated by Pohm et al. (Pohm, A. –V.; Wang, J. -M.; Lee, F. S.; Schnasse, W.; Smay, T. A. "High-Density Very

Efficient Magnetic Film Memory Arrays" IEEE Transactions on Magnetics, **1969**, Mag-5, 3, 408-412) as evidenced by Maxwell et al. (Maxwell, J.; Doty, M. "Processing Guidelines for S.M.P.S. Multilayer Ceramic Capacitors", 2005, 1-6) and Kitada et al. (Kitada, M.; Yamamoto, H.; Tsuchiya, H. "Reaction Between Permalloy and Several Thin Metal Films" Thin Solid Films **1984**, *122*, 173-182).

For ***claim 8, 42, 68***, Pohm et al. (see entire document) disclose a method for forming a memory array (e.g., see Pohm et al, abstract), which anticipates the claimed invention. For example, Pohm et al. disclose forming ten or more inorganic materials on ten or more predefined discrete regions of a rigid substrate using a mask (e.g., see figure 1 showing >10 inorganic materials formed on a rigid glass substrate the locations of which were "predefined" by the use a flat wire mask and sequential vapor deposition techniques; see also Table I showing composition of inorganic materials that were deposited at each site including Cr, Ni-Fe, Cu and Ti; see also Experimental Equipment and Results section). In addition, Pohm et al. disclose that each of the materials is different from each other (e.g., see Table I wherein each layer differs in terms of its thickness). For example, the "Cr" is deposited in layers between 100-300 A, the "Ni-Fe" layers are 1000-1500 A, etc. (e.g., see Table I). Thus, ten different positions on the array, for example, unequivocally contains the following compositions with the maximum and minimum values at each position being:

	Cr	Ni-Fe	Cu	Ti	Ni-Fe
#1	100	1500	1500	400	1500

#2	300	1500	1500	400	1500
#3	100	1000	1500	400	1500
#4	300	1000	1500	400	1500
#5	100	1500	5000	400	1500
#6	300	1500	5000	400	1500
#7	100	1500	1500	200	1500
#8	300	1500	1500	200	1500
#9	100	1500	1500	400	1000
#10	300	1500	1500	400	1000

In addition, the at least ten materials differed in their size and shape (e.g., see figure 1(a) showing different sizes and shapes for each material i.e., compare material on outer edge of array to a material in the center of the array; see also paragraph bridging pages 408 and 409, "Different spacing, both in word and digit line directions, were provided so <u>different sized storage cells</u> could be studied and compared"; see also page 410, paragraph 1, "... word lines with widths of 0.001, 0.002, 0.003 and 0.004 inch were deposited"; see especially figure 2 showing formation of different sizes and shapes). Pohm et al. also disclose forming the array by delivering a first component of the material to the respective predefined discrete region of the substrate to form a first solid layer of the first component on the substrate and delivering a second component of the material to the respective predefined discrete region to form a second solid layer of the second component on the first layer (e.g., see figure 1 wherein the "Cr" is delivered to a first

region on the substrate as a "first component" and "Ni-Fe" is delivered as a "second component" and forms a layer on top of the first layer; alternatively see Table 1 showing that Ni-Fe, Cu and Ti could also be the "first component" with Cu, Ti or Ni-Fe as the second component i.e., any layer that is deposited before another layer can be considered as the "first component"; see also Experimental Equipment and Results section, "The experimental film arrays were made by <u>sequential vapor deposition</u> ... The <u>evaporation mask</u> consists of two orthogonal nickel-chrome wire configurations"; see also specification, page 13, line 20 showing that component can form "layers"). In addition, Pohm et al. disclose varying the composition, concentration, stoichiometry or thickness of the delivered first or second components between respective regions (e.g., see Table I wherein the composition is varied according the amount of Cr, N-Fe, Cu, Ti and Ni-Fe that is deposited at each individual location e.g., <u>100</u> Cr, 1500 Ni-Fe, 1500 Cu, 400 Ti and 1500 Ni-Fe has a different composition and thickness than <u>300</u> Cr, 1500 Ni-Fe, 1500 Cu, 400 Ti and 1500 Ni-Fe; see also paragraph bridging pages 408-409 showing thickness of word line widths to differ from about 0.001 inch to 0.004 inch; see also figure 1(a) showing different thicknesses for various positions on the array).

In addition, Pohm et al. disclose a sufficient amount of space between the ten or more regions such that the delivered components do not substantially interdiffuse between the ten or more regions of the substrate (e.g., see figures 1-2; see also Evaporation Mask and Procedure section).

For ***claims 10 and 11***, Pohm et al. do not explicitly disclose the amounts of Cr, Ni-Fe, Cu, Ti and Ni-Fe for each position in the array, but they do disclose that the

amounts vary for each layer and thus the array must inherently disclose a wide range of amounts for both the first and/or second components i.e., 100-300 A for Cr, 1000-1500 Ni-Fe, etc. varied independently for each position (e.g., see Table I where any of the layers numbered 1-4 could be the first component and any of the layers numbered 2-5 could be the second component). The picture in figure 1(a) also lends support to this conclusion as the sample array is not consistent at all positions. "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). The Office does not have the facilities to make such a comparison and the burden is on the applicants to establish the difference. See *In re Best,* 562 F.2d 1252, 195 USPQ 430 (CCPA 1977) and *Ex parte Gray*, 10 USPQ 2d 1922 1923 (PTO Bd. Pat. App. & Int.).

For ***claims 15-19 and 82***, Pohm et al. disclose one thousand or more different materials comprising two or more layers with a density greater than about 10 regions per cm^2 (e.g., see page 411, column 2, paragraph 1, "For example, two 2 by 2-inch substrates should be capable of storing <u>1024</u> 128-bit words or more"; see also claim 72 above with regard to the density limitation).

For ***claims 23 and 75***, Pohm et al. disclose ten or more regions of the substrate that are defined by chemical or physical barriers such as a mask (e.g., see page 408, column 2, last paragraph wherein a nickel-chrome wire mask is disclosed; see also figure 2).

For ***claim 24***, Pohm et al. disclose chemical vapor deposition techniques (e.g., see Pohm et al., page 408, column 2, "Evaporation Mask and Procedure" section).

For ***claim 26***, Pohm et al. disclose useful magnetic and/or electrical properties (e.g., see figures 3-6).

For ***claims 30-33***, Pohm et al. disclose five different components including Cr, Ni-Fe, Cu, Ti and a second Ni-Fe (e.g., see Table I) and also the use of ferrite i.e., a sixth component (e.g., see figure 1).

For ***claims 43, 69 and 71***, Pohm et al. disclose screening the at least ten different materials for a useful property of interest, and determining the relative performance of at least ten different materials with respect to the property of interest (e.g., see figure 3 where signal current is monitored for different size words lines on the array; see also figure 4-6).

For ***claim 45***, Pohm et al. disclose "layers" of the delivered components (e.g., see Table I and figure 1).

For ***claims 46-48 and 77***, Pohm et al. also disclose a method wherein each of the at least tee different materials further comprises allowing the delivered first and second components of the material to simultaneously interact under a set of conditions (e.g., see figures 3-6; see also page 411, connections section).

For ***claim 49,*** Pohm et al. do not disclose that a reaction takes place between to or more of the components, but the Examiner contends that the permalloy layers react with the underlying metal layers as evidenced by Kitada et al. (see abstract) and thus this feature is <u>inherently</u> disclosed (e.g., see Kitada et al., results; see especially page 181,

Summarizing Remarks, "Although ... copper ... and chromium reacted with permalloy ...").

For ***claims 51-55 and 72***, Pohm et al. also disclose, in addition to the limitations discussed above, forming one hundred or more solid inorganic materials on one hundred or more predefined discrete regions of a rigid substrate, respectively, each of at least one hundred of the materials being different from each other (e.g., see figure 1(a) showing ~150 different solid inorganic materials located at predefined positions in an array which differ is size, shape and composition as discussed above, for example, in claim 68). Pohm et al. also disclose allowing the delivered first and second components of the material to simultaneously interact under a set of conditions (e.g., figure 3 wherein materials interact to produce a signal; see also figures 4-6). Pohm et al. also disclose a substrate comprising at least one hundred material-containing regions at a density of greater than about 10 regions per cm^2 (e.g., see page 410 column 1, paragraph 1 disclosing 0.008 inch, i.e., ~.02 centimeters, element-to-element distance, which would provide ~ 50 elements × 50 elements = 250 elements/cm^2). Pohm et al. also disclose screening these elements for their ability to function in computer memory storage (e.g., see figures; see also page 411, column 2, paragraph 1, "The extremely high element density permits a single manufactured unit of modest size and cost to embody a relatively large storage array. For example, two 2 by 2 inch substrates should be capable of storing 1024 128-bit words or more").

For ***claim 59***, Pohm et al. disclose metal alloys (e.g., see Table 1 wherein Ni-Fe is disclosed).

For ***claim 60***, Pohm et al. disclose the use of ceramics such as ferrite (e.g., see figure 1).

For ***claim 64***, Pohm et al. disclose solid delivery (e.g., see figures 1 and 2).

For ***claim 65***, Pohm et al. disclose sequential deposition of three layers (e.g., see figures 1 and 2; see also Table I; see also Experimental section).

For ***claim 66***, Pohm et al. disclose electron beam evaporation (e.g., see page 408, column 2, second to last paragraph, "The experimental film arrays were made by sequential <u>vapor deposition</u> of the different materials by <u>electron beam</u> heating").

For ***claims 67 and 83***, Pohm et al. disclose components that are both different (e.g., see Table 1 showing different thicknesses; see also figure 2 showing different word dimensions) and the same (e.g., see figure 2 showing materials with the same spacing; see also figures 3 and 6 showing, for example, permalloy layers of the same height). In addition, the Examiner notes that both the "same" and "different" compositions and/or thickness would be immediately envisioned by a person of skill in the art from the teachings of the reference when taken as a whole because Pohm et al. disclose that these steps were routine in the art (e.g., see *In re Graves*, 69 F.3d 1147, 36 USPQ2d 1697 (Fed. Cir. 1995) (prior art reference disclosing a system for testing the integrity of electrical interconnections that did not specifically disclose simultaneous monitoring of output points still anticipated claimed invention if simultaneous monitoring is within the knowledge of a skilled artisan); see also *In re Donohue*, 766 F.2d 531, 533 (Fed. Cir. 1985) (prior art anticipates a claim if it discloses the claimed invention such that a skilled artisan could take its teachings and his own knowledge to possess the claimed invention);

see also *In re LeGrice*, 301 F.2d 929, 936 (C.C.P.A. 1962) (same); see also *In re Best* 562 F.2d 1252, 1254, 195 USPQ 430,433 (CCPA 1997). Evidence that these steps are within the knowledge of a skilled artisan in accordance with *In re Graves* (see above) can be illustrated by the Pohm et al. reference itself which calls these steps "rudimentary" (e.g., see page 411, column 2, paragraph 1).

For ***claim 70***, Pohm et al. also disclose, in addition to the limitations discussed above, delivering five or more components of the material to the respective predefined discrete region of the substrate to form five or more solid layers of the delivered components, each of at least five of the delivered components being an inorganic element or compound (e.g., see Table 1 wherein the 5 layers are numbered 1-5 and include C4, Ni-Fe, Cu, Ti and Ni-Fe).

For ***claim 74***, Pohm et al. also disclose the use of composite materials in addition to the limitations discussed above (e.g., see Table I wherein the Cr, Ni-Fe, Cu, Ti and Ni-Fe layers represent the constituents of the composite materials because they "retain their identities" even when they act in concert for the purpose of computer memory storage; see also specification, page 17, lines 1-6 wherein composite materials are defined).

For ***claim 76***, Pohm et al. also disclose wells formed by layers of chromium (e.g., see figure 1, showing 0.004'' well formed between two Cr/Cu layers).

For ***claims 78 and 80***, Pohm et al. disclose 10 or more inorganic materials (e.g., see figures 1 and 2 showing materials formed by various layers of Cr, Ni-Fe, Cu, Ti and Ni-Fe).

For ***claim 88 and 89***, Pohm et al. also disclose "repeating" the steps of deposition and varying the composition, concentration, stoichiometry or thickness of the delivered first and second components (e.g., see figures 1 and 2 where the steps are "repeated" in different regions) and further disclose screening this array for its ability to function in memory storage as described above.

For ***claim 90***, Pohm et al. also disclose fiver layers and thus includes a third layer (e.g., see Table I).

For ***claim 91***, Pohm et al. also disclose annealing with, for example, soldering techniques (e.g., see page 411, paragraph bridging columns 1-2).

For ***claim 93***, Pohm et al. do not disclose the exact soldering temperature but the Examiner contends that about 200-300 °C would inherently be disclosed by Pohm et al. as evidenced by Maxwell (e.g., see Maxwell et al., page 5, column 1, paragraph 1), which shows tat "reflow soldering" is typically performed at 220-225 °C and must be performed at least at 200-205°C to insure proper wetting and solder joint formation.

For ***claims 96 and 99***, Pohm et al. disclose changing the composition between regions by depositing layers of different thicknesses (e.g., see above, claim 68, table outlining different compositions).

Claim Rejections - 35 USC § 103

6. Claims 8, 10, 11, 15-24, 26, 30-35, 42, 43, 45-49, 51-56, 58-60, 64-72, 74-91, 93, 95, 96, 98 and 99 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pohm et al. (Pohm, A. –V.; Wang, J. -M.; Lee, F. S.; Schnasse, W.; Smay, T. A. "High-Density Very Efficient Magnetic Film Memory Arrays" IEEE Transactions on Magnetics, **1969**, Mag-5, 3, 408-412) in

view of Howard et al. (Howard, J. K.; White, J. F.; Ho, P. S. "Intermetallic compounds of Al and transitions metals: Effect of electromigration in 1-2-μm-wide lines" J. Appl. Phys. 49(7), 1978, 4083-4093) and Makino et al. (Makino, K.; Kawakami, S.; Orihara, S.; Sakai, S. "A Highly Reliable Plated Wire: Study on Corrosion of Magnetic Films" IEEE Transactions on Magnetics **1973**, Mag-9, 3, 500-503) and Lee (Lee, F. S. "A High-Density Coupled-Magnetic-Film Memory Array" IEEE Transactions on Magnetics 1971, Mag-7, 4, 808-872) and Brown et al. (Brown, et al. "High Density Devices using Permalloy propagation of wall-coded bubbles" IEEE Transactions on Magnetics **1979**, Mag-15, 6, 1501-1506) and Jubb et al. (Jubb et al., "Coercivity, structure, and stoichiometry of Permalloy/alumina multilayers" J. Appl. Phys. **1985**, 57, 1, 4192-4194) as evidenced by Maxwell et al. (Maxwell, J.; Doty, M. "Processing Guidelines for S.M.P.S. Multilayer Ceramic Capacitors", 2005, 1-6) and Kitada et al. (Kitada, M.; Yamamoto, H.; Tsuchiya, H. "Reaction Between Permalloy and Several Thin Metal Films" Thin Solid Films **1984**, *122*, 173-182).

For ***claims 8, 10, 11, 15-19, 23, 24, 26, 30-33, 42, 43, 45-49, 51-55, 59, 60, 64-72, 74-78, 80, 82, 83, 88-91, 93, 96 and 99***, Pohm et al. teach all the limitations stated in the 35 U.S.C. 102(b) rejection above (incorporated in its entirety herein by reference), which anticipates and, as a result, renders obvious claims 8, 10, 11, 15-19, 23, 24, 26, 30-33, 42, 43, 45-49, 51-55, 59, 60, 64-72, 74-78, 80, 82, 83, 88-91, 93, 96 and 99.

<u>The prior art teaching of Pohm et al. differ from the claimed invention as follows</u>:

For ***claims 20-22, 56 and 81***, Pohm et al. do not disclose 10,000-1,000,000 different materials. Pohm et al. only disclose ~1,000 materials on the array (e.g., see Pohm et al. rejection for claim 19 under 35 U.S.C. 102(b) above).

For ***claims 34, 35 and 69***, Pohm et al. fail to disclose a total of 7 or 8 components and/or the use of polymeric materials

For ***claim 58***, Pohm et al. fail to disclose the use of intermetallics.

For ***claims 84-87***, Pohm et al. fail to disclose the use of a "gradient" between respective regions.

For ***claim 95***, Pohm et al. do not disclose three layers with thickness ranging from about 100 A to 1000 A.

For ***claim 98***, Pohm et al. do not disclose purposefully altering the stoichiometry of the components (e.g., the first and second permalloy layers).

However, the combined references of Lee, Brown et al., Makin et al., Jubb et al., and Howard et al. teach the following limitations that are deficient in Pohm et al.:

For ***claims 20-22, 56 and 81***, the combined references of Lee, Makino and Howard et al. teach the use of "high density" magnetic memory arrays (e.g., see Lee, abstract; see also page 808, column 2, paragraph 1 wherein >6400 elements/in^2 are disclosed; see also Brown et al., figure 1, wherein the spacing between elements is reduced by a factor of 1000 to 1-2 μm). With respect to the repetition of steps and/or duplication of parts (i.e. number of samples analyzed or number of substrate regions), the courts have consistently held that the mere duplication of parts has no patentable significance unless new and unexpected results are produced (e.g., see *In re Harza*, 274 F.2d 669, 671, 124 USPQ 378, 380 (CCPA 1960)) ("It is well settled that the mere duplication of parts has no patentable significance unless a new and unexpected result is produced . . . . "). Here, a person would have been motivated to make larger arrays with

a larger number of materials to increase the memory capacity (i.e., the size of the array would simply depend on the amount of memory one wished to produce). Pohm et al. described his deposition tools as "rudimentary" even back in 1969 (~25 years before Applicants' earliest effective filing date), which led to the production of ~1,000 samples. Thus, with the advent of 25 years of continued research, progress in the formation of larger arrays would be expected. Furthermore, Pohm et al. state that only a unit of "modest" size can produce a 1,024 array using "rudimentary" techniques and that "better approaches" were available even back in 1969 (e.g., see Pohm et al., page 411, column 2, paragraph 1 where the author clearly envisioned producing larger libraries, ""For example, two 2 by 2-inch substrates should be capable of storing 1024 128-bit words <u>or more</u>"; see also Lee, page 868, column 2 paragraph 1 showing 6400 elements/in^2, which would produce an array of 25,600 elements for the 2×2 inch substrate disclosed by Pohm et al.). Thus, a person of skill in the art would reasonably have expected to be successful because better techniques and larger units and better fabrication techniques were available even in 1969 and later publications show that fabrication line widths could be reduced by several orders of magnitude (e.g., see The combined references of Lee, Brown et al., Makin et al., Jubb et al., and Howard et al., Introduction; see also Conclusion, "experiments show that 1-2 μm wide conductors for integrated-circuit applications can be fabricated using an Al-based metallurgy to yield excellent electromigration lifetimes")

For ***claims 34, 35 and 69***, the combined references of Lee, Brown et al., Makin et al., Jubb et al., and Howard et al. disclose the use of eight components including a

polymeric material. For example, Makino et al. disclose the use of a two layer Ni-P/polyparaxylylen polymer to protect permalloy in from oxidation. Thus, when combined with the teachings of Pohm et al. an "eight" layer (component) array would be produced (e.g., Cr, Ni-Fe, Cu, Ti, Ni-F, Ferrite, Ni-P, polyparaxylylen). In addition, the array would contain the "polymeric" polyparaxylylen.

For ***claim 58***, the combined references of Lee, Brown et al., Makin et al., Jubb et al., and Howard et al. disclose intermetallic compounds of Al (e.g., see Howard et al., abstract and title).

For ***claims 84-87***, the combined references of Lee, Brown et al., Makin et al., Jubb et al., and Howard et al. disclose the use of a thickness gradient when creating memory chips (e.g., see Brown et al., figure 8 showing thickness gradient between 2.7 μm and 1.6 μm regions).

For ***claim 95***, Pohm et al. disclose two layers ranging from 100 A to about 1000 A and a third layer that overlaps with this range e.g., 1000-1500 A (see Table 1), which renders the claimed ranged prima facie obvious. For example, in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. cir. 1990).

For ***claim 98***, the combined references of Lee, Brown et al., Makin et al., Jubb et al., and Howard et al. disclose altering the stoichiometry of permalloy layers in magnetic devices because this alteration changes that materials favorable properties in magnetic

devices (e.g., see Jubb et al., title, "Coercivity, structure, and stoichiometry of Permalloy/alumina multilayers"; see also abstract and Results section).

It would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made to use the Ni-P/polyparaxylylen layers as disclosed by the combined references of Lee, Brown et al., Makin et al., Jubb et al., and Howard et al. to protect the permalloy films from corrosion as disclosed by Pohm et al. because the combined references of Lee, Brown et al., Makin et al., Jubb et al., and Howard et al. explicitly state that their Ni-P/polyparaxylylen layers can be used for this purpose (e.g., see Makino et al., abstract). Furthermore, a person of skill in the art would have been motivated to use the Ni-P/polyparaxylylen layers because Makino et al., for example, state, "The Ni-P layer coated on the film is remarkably effective to prevent corrosion ... [and] no corrosion takes place [when Ni-P is used in conjunction with polyparaxylylen]" (e.g., see Makino et al., page 502, Conclusion). The combined references of Makino et al. also state that such protection is useful for improving the reliability of memory storage devices (e.g., see Makino et al., Introduction and Discussion), which would encompass the memory storage application disclosed by Pohm et al. Furthermore, a person of ordinary skill in the art would have reasonably expected to be successful because the Ni-P/polyparaxylylen layers are used in conjunction with permalloy films like the permalloy film disclosed by Pohm et al.

It would also have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use intermetallic compounds as taught by the combined references of Lee, Brown et al., Makin et al., Jubb et al., and Howard et al. to

construct the memory cells as taught by Pohm et al. because the combined references of Lee, Brown et al., Makin et al., Jubb et al., and Howard et al. explicitly state that intermetallic compounds can be used in integrated-circuit technology (e.g., see Introduction), which would encompass the memory cell applications of Pohm et al. and/or Lee and/or Makino et al. (e.g., see Pohm et al., abstract). Furthermore, one of ordinary skill in the art would have been motivated to use the intermetallic compound of Al because the combined references of Lee, Brown et al., Makin et al., Jubb et al., and Howard state that their use can lead to a reduction in the line width of metal interconnections which is favorable for integrated-circuit design (e.g., see Howard et al., Introduction; see also Conclusion, "experiments show that 1-2 μm wide conductors for integrated-circuit applications can be fabricated using an Al-based metallurgy to yield excellent electromigration lifetimes"). Furthermore, one of ordinary skill in the art would have reasonably expected to be successful because both Pohm et al. and the combined references of Lee, Brown et al., Makin et al., Jubb et al., and Howard teach that their method can be applied for integrated-circuit technology using metal deposition techniques. Finally, it would have been prima facie obvious to use the bubble design with the thickness gradient as disclosed by Brown et al., in conjunction with memory chip design disclosed by Pohm et al. because Brown et al. teach that such a design can improve the storage capacity of the memory chip. A person would reasonably have expected to be successful because Brown et al. disclose the use of Ni-Fe layers like the ones disclosed by Pohm et al. in the memory construction.

In addition, it would have been prima facie obvious to one of ordinary skill in the art to alter the stoichiometry of the permalloy layer as taught by the combined references of Lee, Brown et al., Makin et al., Jubb et al., and Howard et al. to study and/or change the magnetic properties of the memory array as disclosed by Pohm et al. because Jubb et al., for example, explicitly state that such an alteration would have an effect on the materials low coercivities, minimal eddy current losses, and excellent high-frequency response (e.g., see Jubb et al., Introduction), which plays a favorable role in magnetic recording applications like the memory chip disclosed by Pohm et al. (e.g., see Pohm et al., abstract). In addition, a person of skill in the art would have been motivated to alter the stoichiometry to find the optimum working conditions for the memory device as the stoichiometry directly affects the materials performance in such applications (e.g., see Jubb et al., Results and discussion). A person of skill in the art would reasonably have expected to be successful because multi-layer permalloys are used in both references.

Response

7. Applicant's arguments directed to the above 35 U.S.C. § 102/103 rejections were fully considered (and are incorporated in their entirety herein by reference) but were not deemed persuasive for the following reasons. Please note that the above rejection has been modified from it original version to more clearly address applicants' newly amended and/or added claims and/or arguments.

[1] Applicants argue, "Pohm does not disclose or suggest preparing arrays of diverse materials using a protocol that includes varying the composition, concentration, stoichiometry or

thickness of the delivered (e.g., first or second) component, as compared between respective material containing regions" (e.g., see 6/12/06 Response, second to last paragraph).

[2] Applicants argue, "Pohm does not deposit components of materials into different regions of a substrate to form different materials, as required by the claims (e.g., see 6/12/06 Response, page 16, second to last paragraph).

[3] Applicants argue, "Table I cannot be read in the manner that has been speculated about in the Office action. For example, Table I could be referring to the thickness of the layers deposited in a single cell – this interpretation is supported by Pohm, which states, "The cross section of the film structure and the deposition conditions are summarized in Table I." Use of the word "the film" commonly means that there would e only one film that was deposited or analyzed. Pohm also states that only 'two different storage cell structures were made', with each one being made one at a time on different wafers (p. 409 1st full paragraph, first sentence). Thus, Pohm does not disclose that there is more than one film on a wafer, and does not disclose with sufficient clarity that the thicknesses of the layers in the references varied from cell to cell on a single wafer" (e.g., see 6/12/06 Response, page 17, middle paragraph).

[4] Applicants argue, "The Office action engages in speculation about what Table 1 of Pohm might be saying … As the action states the array 'could contain' a variety of compositions, which by clear admission means that the array in Pohm could also not contain those variety of compositions" (e.g., see 6/12/06 Response, page 17, second to last paragraph).

[5] Applicants argue, "Another possible reading of Pohm is that Table I discloses ranges of the layers that are deposited because, at best, those ranges are at the limit of the testing ability of the equipment available in 1969: the ranges show the approximate thickness of the deposited

layers (in angstroms) across the entire substrate. As Pohm states, 'A quartz-crystal thickness monitor was installed to control the evaporation rates and to determine the film thickness' (p. 408). Also there appears to be an error in Table I in the recitation of '5000-1500 Cu', which is backwards. Given the apparent error, as well as use of the phrase 'the film', the reasonable conclusion is that multiple component films where varying the composition, concentration, stoichiometry or thickness of the delivered (e.g., first of second) component, as compared between respective material-containing regions – is not disclosed or suggest by Pohm" (e.g., see 6/12/06 Response, paragraph bridging pages 17 and 18).

[6] Applicants argue, "Table I in Pohm [discloses] that only the same components and the same materials are made in each cell and that the ranges in Table I (e.g., 100-300 Cr) are not composition ranges for different regions of the wafer. Because of this, the materials in each region of Pohm are the same – not different ... With reference to claim 8, there is no difference between the cells in terms of composition stoichiometry or thickness" (e.g., see 6/12/06 Response, page 18, first full paragraph).

[7] Applicants argue, "And with reference to claim 68, there is also no difference between the cells in terms of concentration" (e.g., see 6/12/06 Response, page 18, first full paragraph).

[8] Applicants argue, "In other words, Pohm creates an array of one film of different size cells, and not an array of different materials. To support this, consider that it is not at all clear that the method and equipment of Pohm could have prepared an array with differing compositions in each cell (i.e., Pohm is not enabling to create the array of the present invention). There is no mask to control deposition of the layers into certain regions; instead an evaporation

mask provided different cells of different size, but did not prevent a layer from being deposited into one or more cells. And the shutter of Pohm was for limiting contamination from different sources, not for controlling deposition into certain regions. Thus, there is no disclosure of a capability in Pohm to deposit different amounts of a component into different cells" (e.g., see 6/12/06 Response, page 18, middle paragraph).

[9] Applicants conclude, "Hence, the Pohm reference would not have been understood by a skilled artisan as disclosing the inventions defined by the presently-pending claims, which require … As such, Pohm does not anticipate or suggest the presently-pending claims" (e.g., see 6/12/06 Response, page 18, last paragraph).

[10] Applicants argue, "there is also no reaction and Pohm tries to stop any reaction by lowering the deposition temperature, which means that Pohm actually teaches away from performing a reaction" (e.g., see 6/12/06 Response, page 19, paragraph 1).

[11] Applicants argue, "inherency may ot be established by possibilities or probabilities; rather, the required feature must necessarily flow from the teachings of the reference … Moreover, he secondary references do not support the inherency conclusion. For example, Kitada uses an annealing at a temperature of at least 200C, which is above the 150C process condition of Pohm Table I; Maxwell seems to be completely irrelevant. Thus, reliance on inherency is misplaces as this is not the "reaction" of claim 49" (e.g., see 6/12/06 Response, page 19, paragraph 1).

This is not found persuasive for the following reasons:

[1] The Examiner respectfully disagrees. As stated above, Pohm et al. disclose the maximum and minimum thickness for the deposited layers (e.g., see Table I). Thus, the

thickness varies at 10 positions with the following values, 100/300, 1000/1500, 5000/1500, 200/400, and 1000/1500 for Cr, Ni-Fe, Cu, Ti and Ni-Fe, respectively. In addition, a visual inspection of figure 1(a) shows different thickness for at least 10 positions (e.g., see figure 1(a), bottom row).

[2] Figure 1(a), for example, shows at least 10 "different" positions with different shapes, sizes, compositions and thicknesses.

[3] Figure 1(a) shows "separate" films (i.e., light areas "separated" by dark areas) that varying in thickness (i.e., intensity of the light areas).

[4] The above rejection has been amended to more clearly set forth the Examiner's position and now contains the words "<u>unequivocally</u> contains the following compositions ..." (see above), which renders Applicants' arguments moot.

[5] The Examiner respectfully disagrees. As noted previously by Applicants, "presumed knowledge does not grant a license to read into the prior art reference teachings that are not there" (e.g., see 6/12/06 Response, paragraph bridging pages 16 and 17) or, perhaps expressed in a slightly different way, presumed knowledge does not give Applicants the right to ignore express limitations set forth in a reference. Here, Applicants speculation about the "limits of testing" in 1969 is entirely unsupported. Furthermore, an obvious typographical error (e.g., 5000-1500) does not add credence to this position. Pohm expressly sets forth a range of thicknesses for the 5 deposited layers (e.g., see Table I). Furthermore, in addition to variations in depth (thickness in the z direction), Pohm sets forth variation in height and width (thickness in x and x direction) that can be clearly seen from a simple visual inspection figure 1(a) (see also page figure 2 showing different spacing masks; see especially, page 1969, column 1, paragraph

1, "On one side o the array, word line widths of 0.001, 0.002, 0.003, and 0.004 inch were deposited with magnetic elements whose lengths were mechanically defined during deposition …"). In addition, the variations in depth (intensity of array elements) can clearly be seen in figure 1(a) by the intensity of the spots at each position in the array.

[6] In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "composition ranges for different regions of the wafer") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Here, the claims only require that the materials be "different from each other" (e.g., see claim 42). The manner in which the at least ten materials differ is not specified. Although the at least ten materials "might" differ by thickness at "different regions of the wafer" such a difference is not required. That is, the 10 materials could differ in "height" or "width" or any other characteristic, which has nothing to do with the "depth" set forth in Figure 1 (see figure 1(a) showing different heights and widths). Furthermore, compounds that "differ" in height at each location (e.g., 100-300 Cr at position 1, 100-300 Cr at position 2, … etc.) would still read on the claims. Therefore, Applicants' arguments are not commensurate in scope with the claims. The above arguments would also apply to claim 8.

[7] Claim 68 is not limited to "concentration" differences (e.g., see claim 68 wherein, for example, "thickness" may vary) and, as a result, Applicants' arguments are not commensurate in scope with the claimed.

[8] Applicants arguments are again not commensurate in scope with the claims. For example, Applicants state that Pohm is "not enabling" because Pohm fails to disclose a mask to "control deposition of the layer into certain regions" (see above). However, Applicants' claims likewise fail to claim such a feature. Therefore, to the extent that it can be argued that Pohm is "not enabled", Applicants' claims would likewise be so flawed (e.g., see claim 42, which never recites the use of this allegedly indispensable mask and thus encompasses "maskless" embodiments). Furthermore, figure 1(a), for example, clearly shows an array of different materials on a substrate.

[9] As outlined in the newly amended rejection above, Pohm sets forth every limitation of the claimed invention (see above; see also sections [1]-[8]).

[10] In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., a "reaction") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). For example, see independent claims 8, 42 and 68 wherein the use of a "reaction" is not recited (i.e., the materials are merely "deposited"). In addition, the assertion that Pohm "teaches away" from the claimed invention is inapplicable to a 35 U.S.C. § 102 rejection because no "combination" of references is required.

[11] Although MPEP § 2112 sets forth that a certain result and/or characteristic must "necessarily" flow from the reference, the Courts do permit a "reasonable" amount of "speculation" to determine whether said result and/or characteristic would "necessarily" occur. For example, in *In re Best* (e.g., see *In re Best,* 195 USPQ 430 (CCPA 1977)) the Court upheld

an anticipatory reference under the doctrine of inherency even though it was not clear whether the claimed "cooling step" necessarily flowed from the prior art reference. The claims in *Best* were drawn to a process for stabilizing zeolites from which sodium cations had been removed by ion exchange and further required a "cooling step" that was not expressly recited by the prior art. However, the Court held that this cooling step was inherently disclosed even though it did not "necessarily" flow from the reference. For example, the zeolites in the anticipatory reference could have been handled with gloves while they were hot, avoiding said cooling step. Thus, the Court permitted the Examiner to "speculate" as to the temperature at which the zeolites were handled (i.e., room temperature), which then permitted the Court to deduce that a cooling step "necessarily" occurred based on this speculation. In the present case, it is reasonable to speculate that the reaction would necessarily take place because the same reactants are used at approximately the same temperature. "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). The Office does not have the facilities to make such a comparison and the burden is on the applicants to establish the difference. See *In re Best,* 562 F.2d 1252, 195 USPQ 430 (CCPA 1977) and *Ex parte Gray*, 10 USPQ 2d 1922 1923 (PTO Bd. Pat. App. & Int.). Furthermore, the law of inherency is not "clear" as purported. See *In re Graves,* 69 F.3d 1147, 36 USPQ2d 1697 (Fed. Cir. 1995) (prior art reference disclosing a system for testing the integrity of electrical interconnections that did not specifically disclose simultaneous monitoring of output points still anticipated claimed invention if simultaneous monitoring is within the knowledge of a skilled artisan); see also *In re Donohue*, 766 F.2d 531, 533 (Fed. Cir. 1985) (prior art anticipates a

claim if it discloses the claimed invention such that a skilled artisan could take its teachings and his own knowledge to possess the claimed invention); see also *In re LeGrice*, 301 F.2d 929, 936 (C.C.P.A. 1962) (same). None of the above cases required that a property "necessarily" follow from the teachings of the reference.

Accordingly, the 35 U.S.C. § 102/103 rejections cited above are hereby maintained.

Allowable Subject Matter

8. Claim 94 and 97 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter:

The closest prior art of record, Pohm et al. (see above), do not teach or suggest sintering at a temperature of about 800°C to about 1000°C (e.g., see claim 94) or varying the concentration of the "delivered" components between the claimed regions (e.g., claim 97).

Conclusion

Applicant's amendment necessitated any new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jon D Epperson whose telephone number is (571) 272-0808. The examiner can normally be reached Monday-Friday from 9:00 to 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Paras can be reached on (571) 272-4517. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-1600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jon D. Epperson, Ph.D.
September 19, 2006

JON EPPERSON, PH.D.
PATENT EXAMINER